

IN THE CLAIMS:

On page 22, in line 1 please cancel "CLAIMS" and substitute:

--WE CLAIM AS OUR INVENTION:-- therefor.

Claims 1-13 have been cancelled.

5 1-13. (Cancelled)

Add the following new claims:

14. (New) An apparatus for analyzing cardiac events, comprising:

10 a feature extraction unit, supplied with an electrocardiogram, said
 feature extraction unit deriving features of cardiac events from
 said electrocardiogram and determining a feature vector, by a
 wavelet transform operating on said electrogram, describing
 waveform characteristics of cardiac events in said electrogram;
 and

15 a clustering unit provided with said feature vector, said clustering unit
 determining a distance between said feature vector and
 corresponding cluster feature vectors and assigning a cardiac
 event in said electrogram to a particular cluster that results in a
 minimum distance, as long as said minimum distance is less
 than a predetermined threshold value.

20 15. (New) An apparatus as claimed in claim 14 wherein each of said
 clusters is defined by a cluster center μ_i and a co-variance matrix Σ_i for the
 cluster features of that cluster, and wherein said clustering unit determines a
 distance function D_i^2 between each event feature vector and said cluster μ_i .

25 16. (New) An apparatus as claimed in claim 15 wherein said
 clustering unit calculates said distance using Mahalanobis distance criterion.

17. (New) An apparatus as claimed in claim 15 wherein said clustering unit determines said minimum distance by a grid search over a duration of the cardiac event.

18. (New) An apparatus as claimed in claim 14 comprising an
5 integrator that integrates said distance over a predetermined period of time.

19. (New) An apparatus as claimed in claim 14 wherein said clustering unit updates said cluster feature according to a predetermined rule dependent on said minimum distance.

20. (New) An apparatus as claimed in claim 14 wherein said
10 clustering unit generates a new cluster if said minimum distance exceeds said predetermined threshold value, by setting features for said new cluster equal to the event features of the cardiac event that resulted in said minimum distance exceeding said predetermined threshold value.

21. (New) An apparatus as claimed in claim 14 wherein said
15 clustering unit terminates clusters that fail to have a predetermined number of cardiac events grouped therein within a predetermined time period.

22. (New) An apparatus as claimed in claim 14 wherein said clustering unit performs a likelihood-based search sequence over said clusters to determine said minimum distance.

20 23. (New) An apparatus as claimed in claim 14 wherein said clustering unit determines said minimum distance by a grid search only over clusters in which cardiac events have been grouped within a duration of the cardiac event.

24. (New) An apparatus as claimed in claim 14 wherein said
25 clustering unit calculates a distance of a cardiac event in question from a cluster in which a cardiac event was previously grouped.

25. (New) An apparatus as claimed in claim 14 comprising a classifier that associates said clusters respectively with different cardiac rhythms according to predetermined rules.

26. (New) A heart stimulator comprising:

5 a pulse generator adapted to interact with a subject to deliver stimulation pulses to the subject;

an apparatus for analyzing cardiac events comprising a feature extraction unit, supplied with an electrocardiogram, said feature extraction unit deriving features of cardiac events from said electrocardiogram and determining a feature vector, by a
10 wavelet transform operating on said electrogram, describing waveform characteristics of cardiac events in said electrogram, and a clustering unit provided with said feature vector, said clustering unit determining a distance between said feature vector and corresponding cluster feature vectors and assigning
15 a cardiac event in said electrogram to a particular cluster that results in a minimum distance, as long as said minimum distance is less than a predetermined threshold value; and

an arrhythmia detection and control unit connected to said pulse
20 generator for controlling emission of stimulation pulses from said pulse generator dependent on detection of an arrhythmia dependent on the cluster in which the cardiac event is grouped.